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|---|---|
| BARTH, VINCENT P | |
| **ART UNIT** | **PAPER NUMBER** |
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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/630,479 | CHANG, TZYY-SHUH | |
| | Examiner | Art Unit | |
| | Vincent P. Barth | 2877 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *06 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-10, 15-18 and 20 are rejected under 35 U.S.C. §103(a)) as being unpatentable over Milnes, U.S. Patent No. 3,187,185 (1 Jun., 1965).

3. Referring to Claim 1, Milnes discloses a device for: (i) determining the surface contours of an object, such as high-temperature metals in metal foundries, wherein the object or metal is at such temperatures that it will have a self emitted EMR, described therein in one exemplary embodiment as "red-hot steel" (col. 1, ln. 69). Milnes further discloses: (ii) an EMR source, in the form of a light (col. 1, ln. 53), and (iii) a EMR detector or sensor in the form of a camera (col. 1, ln. 57). Milnes further discloses: (iv) that the system may project a different wavelength EMR upon the object than the object's self-emitted wavelength (col. 1, lns. 65-69). The example provided therein, is one exemplary embodiment in which the sample is glowing red-hot (i.e. self-emitting in the red spectrum of visible light), and wherein a blue or ultra-violet beam may be incident upon it, such that the self emitting EMR is distinguishable. Claim 1 contains the elements of Milnes discussed in the paragraph above, in particular elements (i)-(iv), and Applicant has added the additional limitation that the incident light source has a wavelength

which is selected as a function of the temperature and material composition of the object. Claim 1 calls for a device producing an image from an object with a temperature dependent, dominant, self-emitting EMR, which corresponds to (i) above, the imaging of the "red-hot steel" or other high-temperature objects. In this context, in one exemplary embodiment the "dominant" self-emitting radiation in Milnes is red, and such is clearly temperature dependant, since the metal will emit differently at different temperatures in other embodiments (i.e. different temperature configurations). Applicant has argued that the example of the color red provided in Milnes suggests that human eyesight is involved, and therefore that the colors perceived by humans is relevant. The Examiner disagrees, since Milnes clearly discloses a machine vision apparatus and method (i.e., using cameras for sensing and analysis), in which human color perception is not relevant. It is the opinion of the Examiner that in the context of the disclosure in Milnes, which describes a machine vision system, the the term "color" is indeed intended to indicate wavelength, and would be understood as such by those practicing the invention. Moreover, the strict construction of the term "red hot" in Milnes by Applicant to mean only precisely red, as opposed to other spectral ranges is too narrow, and not supported by the reference. Applicants have also argued that that the emission spectrum of the hot body in Milnes is never discussed as a function of temperature. However, the emission spectra of hot objects, both in and outside of the visible range have been well known for a considerable time, and thus would have been understood by those practicing the invention disclosed in Milnes. The fact that emission spectra of hot objects have been known also has a bearing on the new proposed limitation that the incident light source is selected as a function of temperature and material composition of the object. Since Milnes is clear that the incident light must have a color which is contrasted with

the object's self emitted radiation, and since such emission spectra have been known, those skilled in the art would understand that such results in a functional dependence on the emitted radiation. Applicant further argues that the invention in Milnes can not function, since Milnes suggests that the surface of the conveyor contrast with the beam (citing Milnes at col. 1, lns. 70-71). However, it is the opinion of the Examiner that any contrast with the conveyor surface is merely an ancillary feature of the disclosure in Milnes, and is thus not dispositive. The critical feature in Milnes is that "the color of *the beam* of light 6 is selected so that it *contrasts with the color of the workpiece* P" (col. 1, lns. 66-68, emphasis added). Please also note the discussion regarding the conveyor in the section below entitled Comments.

4. Referring to Claim 2, Milnes discloses a system of television cameras, however, it does not explicitly include video recorders attached to said cameras. However, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add such an element. It was commonly known that a video camera may be attached to a television camera to record events. See, MPEP §2144.03, and In re Malcolm, 129 F.2d 529, 54 U.S.P.Q. 235 (1942).

5. Referring to Claim 3, Milnes discloses a system of television cameras, however, it does not explicitly include a CCD as a substitute for said cameras. However, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to make such a substitution from the prior art in Milnes. It was commonly known in the art that a CCD may be substituted for a television camera. See, MPEP §2144.03.

6. Referring to Claim 4, the claim seeks to add a further limitation in that the light beam incident on the surfaces should be at least one light from a group consisting of metal-halite lamps, fluorescent lamps, and xenon lamps. Milnes has, as one preferred embodiment, a

generically describe light source, although additional light sources are permitted as well. The Specification does not disclose the reason for limiting the types of light to metal-halite lamps, fluorescent lamps, and xenon lamps, when other art recognized equivalents may be suitable for the same purpose, and as such is a non-critical limitation. Moreover, the last paragraph at page 8 of the instant Application it is stated that other types of light sources may be used, as long as the desired wavelengths may be generated. Accordingly, the limitation of the group of lights to only metal-halite lamps, fluorescent lamps, and xenon lamps does not patentably distinguish over the prior art of Milnes.

7. Referring to Claim 5, Milnes discloses a system in which the light source is described generically. However, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to make a substitution with a laser from the prior art in Milnes. It is commonly known in the art that a laser may be used as a light source, and this would be a choice suggested by Milnes in the context its disclosure. Milnes discloses a system wherein the dominant frequency of the self-emitting radiation from the object is to be distinguishable from the source light incident on said object. Thus, a narrow band of incident light, either filtered from a broad spectrum source, or a narrow band source would be used, whereby the latter design choice could be met by a laser. Therefore, such substitution would have been obvious to those skilled in the art at the time of the invention.

8. Referring to Claim 6, it is commonly known in the art that when a laser is used as a point light source, a various techniques may be used to illuminate an area larger than the point, such as a "zone of illumination", as are demonstrated at page 9 in the instant Application. Therefore, such substitution would have been obvious to those skilled in the art at the time of the invention.

9. Referring to Claim 7, Milnes discloses a system of light sources, however, it does not explicitly include mirrors to direct them. However, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add such an element. It is commonly known in the field of optics that mirrors may be used to direct light sources. See, MPEP §2144.03, and In re Malcolm, 129 F.2d 529, 54 U.S.P.Q. 235 (1942).

10. Referring to Claim 8, Milnes discloses a system in which contours of the object as well as thickness are measured. Towards this end, multiple lines of light, and other configurations of light are created from the beams incident upon the object (col. 2, lns. 3-13). This includes a measuring beam, and a reference beam (col. 2, lns. 12-13). The description of these beams found in Milnes are consistent with the description at page 9 in the instant Application. Accordingly, the proposed limitation in Claim 8 is not patentably distinguishable over the prior art in Milnes.

11. Referring to Claim 9, Milnes discloses a system in which a high-temperature object may be imaged with video cameras, and in which a wavelength different from the self-emitted wavelength may be directed at the object to be distinguishable therefrom. Thus, the ability to image the object is inherent in the system, since a variety of wavelengths may be required based on the range of self-emitting wavelengths, versus the range of source wavelengths which must differ therefrom. Accordingly, the proposed limitation in Claim 9 is not patentably distinguishable over the prior art in Milnes.

12. Referring to Claim 10, Milnes discloses a system in which a high-temperature object may be imaged with video cameras, and in which a wavelength different from the self-emitted wavelength may be directed at the object to be distinguishable therefrom. Moreover, by virtue of

the high temperature of the object as exemplified in Milnes, that is, glowing "red-hot" (col. 1, ln. 69), it will necessarily emit in a variety of wavelengths, including the range of 175 to 1000 nm (i.e., mid UV to near IR). Thus, the CCD must have the ability to image the objects in a variety of wavelengths, based on the range of self-emitting wavelengths, versus the range of source wavelengths which must differ therefrom. Accordingly, the proposed limitation in Claim 10 is not patentably distinguishable over the prior art in Milnes.

13. Referring to Claim 15, Milnes discloses a system of light sources, however, it does not explicitly include mirrors to direct them. However, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add such an element. It is commonly known in the field of optics, that modulation of the incident beam, and demodulation of the reflected beam received may be used to distinguish background radiation, or in this case self-emitted radiation, from the source light incident upon the object. See, MPEP §2144.03, and In re Malcolm, 129 F.2d 529, 54 U.S.P.Q. 235 (1942).

14. Referring to Claim 16, the Specification does not draw an appropriate distinction between the pulsing of the light source, as in the instant claim, and modulation of the light source, as in Claim 16. Nevertheless, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add such an element. It is commonly known in the field of optics, that modulation of the incident beam, and demodulation of the reflected beam received may be used to distinguish background radiation, or in this case self-emitted radiation, from the source light incident upon the object. Therefore, since the modulation and the pulsing of the source beam are functionally equivalent, the same principle applies.

15. Referring to Claims 17 and 18, Milnes provides a system in which both the surface contours, and the thickness of the object can be measured, therefore a variety of configurations are within the scope of its disclosure. In particular, see Figure 7 of Milnes, in which a plurality of EMR sources in the form of lights, as well as sensor in the form of cameras or television cameras are contained therein.

16. Referring to Claim 20, Milnes discloses a light source 4, wherein in one exemplary embodiment the light is in the form of a plane of light (col. 2, ln. 6). However, the image analysis scheme does not appear to hinge on such structured illumination, therefore alternative embodiments in which a larger area were to be illuminated would have been obvious to those skilled in the art at the time of the invention. Moreover, the strict construction of the term "area" to preclude a line of light as is disclosed in Milnes is not supported in the reference.

17. Claims 11-13, and 19 are rejected under 35 U.S.C. §103(a)) as being unpatentable over Milnes, U.S. Patent No. 3,187,185 (1 Jun., 1965), in view of King, U.S. Patent No. 5,995,008 (30 Nov., 1999).

18. Referring to Claims 11 and 12, Milnes discloses a filter which may be interposed between the workpiece and the sensing device, such that the visibility is enhanced (col. 1, ln. 71 to col. 2, ln. 2). This disclosure of a filter is generic in form, and should be read in the context of that same paragraph in which the workpiece is at high temperatures, and thereby emitting a characteristic EMR. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add a filter, including an interference filter. Moreover, it is commonly known in the field of optics that filters may be used to reduce the effects of

undesired EMR frequencies before such are incident upon a sensor, so as to achieve meaningful and more accurate results for later analysis. For example, King discloses that interference filters have been used in imaging and spectral analysis in the context of flame and fire detectors (col. 2, ln. 49). Milnes and King are analogous art, since they are from a similar problem solving area, in that each involves viewing high temperature subjects. See Medtronic, Inc. v. Cardiac Pacemakers, 721 F.2d 1563, 1572-1573, 220 USPQ 97, 103-104 (Fed. Cir., 1983). The motivation for combining the references would have been to improve the imaging of high temperature subjects. Accordingly, it would have been obvious to those skilled in the art to combine the references, at the time of the invention, in order to gain such benefit.

19. Referring to Claim 13, King also discloses the use of a cut-off filter in imaging and spectral analysis in the context of flame and fire detectors (col. 4, lns. 40-43).

20. Referring to Claim 19, one exemplary "dominant" self-emitting radiation in Milnes is red, and such is clearly temperature dependant, since the metal will emit differently at different temperatures. Milnes discloses a television camera, which corresponds to the video camera in Claim 19, and a light source 4 (see Fig. 1). Claim 19 also calls for an interference filter. Milnes discloses a filter which may be interposed between the workpiece and the sensing device, such that the visibility is enhanced (col. 1, ln. 71 to col. 2, ln. 2). This disclosure of a filter is generic in form, and should be read in the context of that same paragraph in which the workpiece is at high temperatures, and thereby emitting a characteristic EMR. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add an interference filter. The reason for such, is that it is commonly known in the field of optics, that filters may be used to reduce the effects of undesired EMR frequencies before such are incident

upon a sensor, so as to achieve meaningful and more accurate results for later analysis. King discloses that interference filters have been used in imaging and spectral analysis in the context of flame and fire detectors (col. 2, ln. 49).

21. Claims 14, 21 and 22 are rejected under 35 U.S.C. §103(a)) as being unpatentable over Milnes, U.S. Patent No. 3,187,185 (1 Jun., 1965), in view of Fishman, U.S. Patent No. 4,744,407 (17 May, 1988).

22. Claim 14 contains all of the limitations in Claim 1, but seeks to add a further limitation in that an air flow controller provides air to the object to remove air density distortion. As discussed above, Milnes discloses, *inter alia*, a system in which an object, such as high-temperature metal in a metal foundry, is at such temperatures that it will have a self emitted EMR, described therein as "red-hot steel" (col. 1, ln. 69). Moreover, as is in the nature of such high-temperature environments in metal foundries and the like, the heat emitted from the object causes disturbances in the air, and thus optical distortions resulting therefrom. The Specifications at p. 11 of the Application states that such air flow controller "decreases the temperature gradient around the hot object", indicating that cool air at a sufficient pressure to meet the desired flow rate would be introduced. Fishman involves a system in which molten metals must be observed in a foundry, and wherein "chilled air" is introduced to prevent "interference" with the vision of the camera (col. 4, lns. 61-66). Although the language of Fishman does not explicitly state that the "chilled air" reduces optical distortion, it is clear from the context of a camera imaging molten metals, that the temperature of the air serves this purpose, and the term "interference" as used in Fishman is intended to mean "optical distortion"

as used in the instant claim. Moreover, the chilled air or other inert gas are introduced at a "positive pressure", again indicating from the context that a flow of air at an appropriate rate passing the hot object is maintained (col. 4, ln. 64). Therefore, Fishman suggests that when imaging an object at sufficiently high temperatures that optical distortion occurs, one would introduce chilled air passing the object at an appropriate flow rate to control such effects. Milnes and Fishman are analogous art, since they are from a similar problem solving area, in that each involves viewing high temperature subjects. See Medtronic, Inc. v. Cardiac Pacemakers, 721 F.2d 1563, 1572-1573, 220 USPQ 97, 103-104 (Fed. Cir., 1983). The motivation for combining the references would have been to improve the imaging of high temperature subjects. Accordingly, it would have been obvious to those skilled in the art to combine the references, at the time of the invention, in order to gain such benefit.

23. Referring to Claim 21, Milnes discloses an EMR source in the form of a light 4 (see Fig. 1), a detector in the form of a camera 11, and as discussed above at length, a system in which the incident light contrasts with self-emitted radiation of the hot object. Milnes does not disclose that an airflow controller is introduced to reduce the temperature gradient and thereby remove optical distortion. Fishman involves a system in which molten metals must be observed in a foundry, and wherein "chilled air" is introduced to prevent "interference" with the vision of the camera (col. 4, lns. 61-66). Although the language of Fishman does not explicitly state that the "chilled air" reduces optical distortion, it is clear from the context of a camera imaging molten metals, that the temperature of the air serves this purpose, and the term "interference" as used in Fishman is intended to mean "optical distortion" as used in the instant claim. Milnes and Fishman are analogous art, since they are from a similar problem solving area, in that each

involves viewing high temperature subjects. The motivation for combining the references would have been to improve the imaging of high temperature subjects. Accordingly, it would have been obvious to those skilled in the art to combine the references, at the time of the invention, in order to gain such benefit.

24. Referring to Claim 22, the combination of Milnes and Fishman would not explicitly address the issue of adjusting the cooling airflow such that the temperature distribution of the object were not adversely affected. However, "[I]t is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). See MPEP §2144.05(II). In the context of the instant invention, knowing that ambient temperatures might affect the final metal product, those practicing the invention would clearly experiment with the temperature of the cooling airflow until arriving at a suitable temperature mix not affecting said final metal product.

***Comments***

25. As stated above in the discussion of Claim 1, the contrast between the conveyor and the workpiece as set forth in Milnes is merely an ancillary feature. Nevertheless, in a good faith effort to respond to Applicant's arguments, a brief discussion follows. Figure 7 in Milnes illustrates the workpiece P moving along a conveyor system comprised of rollers, the material composition of which is not specified, but could quite certainly be formed of a ceramic shell. Ceramics have been known since antiquity to withstand high temperatures (i.e., well over 1000 °C), and may be found in some variety of colors. It is not necessary that the entire and continuous color spectrum be available from ceramics to suit the system disclosed in Milnes,

merely enough colors to allow for adequate contrast in response to the self emitted radiation. Moreover, new generations of ceramics have been engineered in the past decades to withstand even higher temperatures and stresses than had been known historically, and are now used in extraordinarily diverse applications. Therefore, painting the conveyor would not be necessary to achieve contrast if ceramics were used. In addition, Milnes states that the incident radiation may be in the UV spectrum (col. 1, ln. 69), and assuming that the conveyor doesn't emit too highly in the UV range as it gains temperature, virtually any conveyor color would contrast with the incident UV light. It should be emphasized that the feasibility or obviousness of the above suggestion is not dispositive, since the contrast between the workpiece and the conveyor has been deemed by the Examiner to be merely ancillary.

## *CONCLUSION*

26. Applicant's Claims 1-22 are rejected based on the reasons set forth above.

27. Any inquiries concerning this communication from the examiner should be directed to Vincent P. Barth, whose telephone number is 703-605-0750, and who may be ordinarily reached from 9:00 a.m. to 5:30 p.m., Monday through Friday.

28. If attempts to reach the examiner prove unsuccessful, the examiner's supervisor is Frank G. Font, who may be reached at 703-308-4881.

29. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.

Richard A. Rosenberger
Primary Examiner